JC447 U.S. PTO
06/11/98

Practitioner's Docket No. CYNO - 4

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): CHO, George E.
FURUMOTO, Horace

WARNING: Patent must be applied for in the name(s) of all of the actual inventor(s). 37 CFR 1.41(a) and 1.53(b)

For (title): SYSTEM AND METHOD FOR NON-INVASIVE WRINKLE REMOVAL AND SKIN TREATMENT

CERTIFICATION UNDER 37 C.F.R. 1.10*
(Express Mail label number is mandatory.)
(Express Mail certification is optional.)

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date 11 June 1998, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EE 327764447US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Don Halgrey
(type or print name of person mailing paper)

[signature]
Signature of person mailing paper

WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

WARNING:* *Each paper or fee filed by "Express Mail"* ***must* *have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).*
"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will ***not*** *be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442*

1. **Type of Application**

This new application is for a(n)

(check one applicable item below)

☒ Original (nonprovisional)

☐ Design

☐ Plant

WARNING: ***Do not*** *use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.*

WARNING: ***Do not*** *use this transmittal for the filing of a provisional application.*

NOTE: If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

☐ Divisional.

☐ Continuation.

☐ Continuation-in-part (C-I-P).

2. **Benefit of Prior U.S. Application(s)** (35 U.S.C. 119(e), 120, or 121)

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

WARNING: *If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. 120, 121 or 365(c). (35 U.S.C. 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.*

WARNING: *When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application* ***must*** *be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).*

☐ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. **Papers Enclosed That Are Required for Filing Date under 37 C.F.R. 1.53(b) (Regular) or 37 C.F.R. 1.153 (Design) Application**

7 Pages of specification plus

3 Pages of claims plus

1 Pages of Abstract plus

2 Sheets of drawing

☐ formal

☒ informal

WARNING: ***DO NOT*** *submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. Comments on proposed new 37 CFR 1.84. Notice of March 9, 1988 (1990 O.G. 57-62).*

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page." 37 C.F.R. 1.84(c)).

(complete the following, if applicable)

☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. 1.84(b).

4. Additional papers enclosed

☐ Preliminary Amendment

☐ Information Disclosure Statement (37 C.F.R. 1.98)

☐ Form PTO–1449 (PTO/SB/08A and 08B)

☐ Citations

☐ Declaration of Biological Deposit

☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.

☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative

☐ Special Comments

☐ Other

5. Declaration or oath

☐ Enclosed

Executed by

(check ***all*** *applicable boxes)*

☐ inventor(s).

☐ legal representative of inventor(s). 37 CFR 1.42 or 1.43.

☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ This is the petition required by 37 CFR 1.47 and the statement required by 37 CFR 1.47 is also attached. See item 13 below for fee.

☒ Not Enclosed.

WARNING: Where the filing is a completion in the U.S. of an International Application, but where a declaration is not available, or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

☐ Application is made by a person authorized under 37 C.F.R. 1.41(c) on behalf of *all* the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 CFR 1.16(e) can be filed subsequently).

NOTE: It is important that all the correct inventor(s) are named for filing under 37 CFR 1.41(c) and 1.53(b).

☐ Showing that the filing is authorized.
(not required unless called into question. 37 CFR 1.41(d))

6. Inventorship Statement

WARNING: *If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.*

The inventorship for all the claims in this application are:

☒ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. A verified English translation of the non-English language application and the processing fee of $130.00 required by 37 CFR 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 CFR 1.52(d).

NOTE: A non-English oath or declaration in the form provided or approved by the PTO need not be translated. 37 CFR 1.69(b).

☒ English

☐ Non-English

☐ The attached translation is a verified translation. 37 C.F.R. 1.52(d).

8. Assignment

☒ An assignment of the invention to CYNOSURE, INC

☐ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☒ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters-one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: *A newly executed "CERTIFICATE UNDER 37 CFR 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.*

9. **Certified Copy**

Certified copy(ies) of application(s)

Country	Appln. No.	Filed
Country	Appln. No.	Filed
Country	Appln. No.	Filed

from which priority is claimed

☐ is (are) attached.

☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 CFR 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U S C. 120 is itself entitled to priority from a prior foreign application, then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. **Fee Calculation** (37 C.F.R. 1.16)

A. ☒ Regular application

CLAIMS AS FILED			
Number filed	Number Extra	Rate	Basic Fee 37 C.F.R. 1.16(a) $790.00
Total Claims (37 CFR 1.16(c)) 12 − 20 =	×	$ 22.00	—
Independent Claims (37 CFR 1.16(b)) 2 − 3 =	×	$ 82.00	—
Multiple dependent claim(s), if any (37 CFR 1.16(d))	+	$270.00	

☐ Amendment cancelling extra claims is enclosed.

☐ Amendment deleting multiple-dependencies is enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 CFR 1.16(d).

Filing Fee Calculation $790.00

B. ☐ Design application
($330.00—37 CFR 1.16(f))

Filing Fee Calculation $_____

C. ☐ Plant application
($540.00—37 CFR 1.16(g))

Filing fee calculation $_____

11. Small Entity Statement(s)

☒ Verified Statement(s) that this is a filing by a small entity under 37 CFR 1.9 and 1.27 ~~is (are) attached~~. will be filed

WARNING: "Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. A nonprovisional application claiming benefit under 35 U.S.C. 119(e), 120, 121 or 365(c) of a prior application may rely on a verified statement filed in the prior application if the nonprovisional application includes a reference to a verified statement in the prior application or includes a copy of the verified statement filed in the prior application if status as a small entity is still proper and desired." 37 C.F.R. § 1.28(a).

(complete the following, if applicable)

☐ Status as a small entity was claimed in prior application _____ / _____, filed on _____, from which benefit is being claimed for this application under:

35 U.S.C. ☐ 119(e),
☐ 120,
☐ 121,
☐ 365(c),

and which status as a small entity is still proper and desired.

☐ A copy of the verified statement in the prior application is included.

Filing Fee Calculation (50% of **A**, **B** or **C** above)

$ 395.00

NOTE: Any excess of the full fee paid will be refunded if a verified statement and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 CFR 1.28(a).

12. Request for International-Type Search (37 C.F.R. 1.104(d))

(complete, if applicable)

☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. **Fee Payment Being Made at This Time**

☒ Not Enclosed

☒ No filing fee is to be paid at this time.
(This and the surcharge required by 37 C.F.R. 1.16(e) can be paid subsequently.)

☐ Enclosed

- ☐ Filing fee $ _____
- ☐ Recording assignment ($40.00; 37 C.F.R. 1.21(h)) (See attached "COVER SHEET FOR ASSIGNMENT ACCOMPANYING NEW APPLICATION".) $ _____
- ☐ Petition fee for filing by other than all the inventors or person on behalf of the inventor where inventor refused to sign or cannot be reached ($130.00; 37 C.F.R. 1.47 and 1.17(h)) $ _____
- ☐ For processing an application with a specification in a non-English language ($130.00; 37 C.F.R. 1.52(d) and 1.17(k)) $ _____
- ☐ Processing and retention fee ($130.00; 37 C.F.R. 1.53(d) and 1.21(l)) $ _____
- ☐ Fee for international-type search report ($40.00; 37 C.F.R. 1.21(e)) $ _____

NOTE: 37 CFR 1.21(l) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 CFR 1.53(d) and this, as well as the changes to 37 CFR 1.53 and 1.78, indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(l) must be paid, within 1 year from notification under § 53(d).

Total fees enclosed $_____

14. **Method of Payment of Fees**

- ☐ Check in the amount of $_____
- ☐ Charge Account No. _____ in the amount of $_____.

A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 CFR 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: If no fees are to be paid on filing, the following items should not be completed.

WARNING: Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

☐ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. _____:

- ☐ 37 C.F.R. 1.16(a), (f) or (g) (filing fees)
- ☐ 37 C.F.R. 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 CFR 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

- ☐ 37 C.F.R. 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)
- ☐ 37 C.F.R. 1.17 (application processing fees)

WARNING: While 37 CFR 1.17(a), (b), (c) and (d) deal with extensions of time under § 1.136(a), this authorization should be made only with the knowledge that: "Submission of the appropriate extension fee under 37 C.F.R. 1.136(a) is to no avail unless a request or petition for extension is filed." (Emphasis added). Notice of November 5, 1985 (1060 O.G. 27).

- ☐ 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 CFR 1.311(b).

NOTE: 37 CFR 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . issue fee." From the wording of 37 CFR 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

16. Instructions as to Overpayment

- ☐ Credit Account No. _____
- ☑ Refund

Reg. No. 27056

Tel. No. 978526-8000

Customer No.

SIGNATURE OF PRACTITIONER

Don Halgren

(type or print name of attorney)

35 Central Street

P.O. Address

Manchester MA 01944

☐ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

☐ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added _____

☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added _____

☑ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

☐ **Statement Where No Further Pages Added**

(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)

☒ This transmittal ends with this page.

System and Method for Non-invasive Wrinkle Removal and Skin Treatment

Background of the Invention

Field of The Invention

The present invention relates to the field of resurfacing skin, or wrinkle removal using laser radiation for treatment of underlying layers of skin.

Prior Art

Plastic surgeons, dermatologists and their patients continually search for new and approved methods for treating the effects of an aging skin. Historically, the treatment of facial wrinkles was primarily accomplished with the use of chemical peels or dermabrasion. The use of chemical peels has fallen out of favor, because it is difficult to accurately control and predict the depth of tissue injury after such peels are applied. Deeper chemical peels in particular have an increased risk of hypopigmentation and scarring. Such injury to the top layer of skin, which would be peeled away, would permit new cells to supposedly rejuvenate the skin. A less expensive way of injuring the outer layer of the skin is the utilization of an abrasive wheel, to rough off the skin layer. This method is not well controlled, and is very difficult especially around the eyelids.

Laser skin resurfacing began with a carbon dioxide laser. The carbon dioxide laser energy is absorbed by tissue water causing vaporization of the outer skin layer. Carbon dioxide lasers have been utilized for approximately 3 decades. However it has only been the past few years that these lasers have been arranged to remove only thin tissue layers with minimal heat damage to the surrounding skin. While carbon dioxide lasers may remove about 150 microns of skin, that skin may take a month or more to heal under such a procedure.

Er:YAG lasers have been utilized to ablate even thinner layers of tissue than carbon dioxide layers. However they lack the coagulation characteristics and thus allow more bleeding than a carbon dioxide laser during use.

Non-ablative skin resurfacing, is a methodology which does not take the top layer of skin off, but which shrinks the collagen under that skin, and modifies that collagen, so that the wrinkled skin appears to be fill-in by the collagen modified beneath the skin. This methodology however, has a low efficiency, and a cryogen coolant must be sprayed on to the skin so as to minimize damaging the top or upper layer thereof and also to minimize pain generation. The "fluence" or energy density used is greater than 10 joules per square centimeter and to be more effective this fluence often reaches 30 Joules per square centimeter. This level of energy often causes pain and epidermal damage.

It is an object of the present invention to improve upon the shortcomings of the prior art.

It is yet a further object of the present invention to provide a skin resurfacing laser treatment, which is nonablative, and minimizes any pain to the patient being treated.

It is yet still a further object of the present invention, to provide a new method to stimulate the collagen beneath the skin surface, to improve the surface appearance from beneath that surface of skin of the patient.

Brief Summary of The Invention

The present invention comprises a system and methodology for noninvasive wrinkle removal for the modification of collagen beneath the epidermis. The laser system of the present invention, in a preferred embodiment, utilizes a pulsed dye laser having a deep penetrating wavelength of about 585 nanometers (nm) laser, so as to target hemoglobin of blood in the skin tissue. This particular laser energy is absorbed by the hemoglobin. The heat is generated in the skin area up to about 1 mm in depth and typically uses energy of less than 5 Joules per square cm, having a preferred target spot size of about 10 mm diameter.

The pulsed dye laser apparatus of the present invention includes a handpiece connected by an optical fiber or wave guide, critically, to a pulsed dye laser generator device.

The handpiece focuses, through a plurality of lenses, the pulsed dye laser light from the pulsed dye laser generator, onto the spot of about 10 mm in diameter, so as to stimulate new collagen growth beneath the epidermis without injuring the surrounding structures.

In the preferred embodiment of the present invention, the pulse width has a range of 150 microseconds to about 1500 microseconds with a preferred width of about 450 microseconds. The wavelength of the pulsed dye laser apparatus of the present invention lies in a range of about 570 nanometers to about 650 nanometers, with a preferred wavelength of about 585 nanometers. The present invention provides a preferred fluence of less than 5 Joules per square cm., and preferably 3 Joules per square cm at a 10-millimeter diameter skin treatment spot.

By treating the skin to this low fluence pulsed dye laser light, collagen may be stimulated to regenerate and "fill in" valleys of wrinkles for a younger more clearer skin.

Thus what has been shown is a new method of stimulating modification of the collagen layer at a depth of at least about 1 mm to about 1.2 mm beneath the skin surface,

utilizing a low energy level of less than 5 Joules per square cm., in a manner not appreciated by the prior art.

The invention thus comprises a method for the treatment of wrinkles on human skin, by stimulating collagen growth beneath the epidermis layer, comprising the steps of: arranging a pulsed dye laser generator in light communication with a pulsed dye laser delivery device; applying said pulsed dye laser delivery device against tissue having wrinkles; generating a pulsed dye laser light by said pulsed dye laser; and directing said pulsed dye laser light from said pulsed dye laser delivery device onto said tissue, to reach hemoglobin in a collagen layer beneath the surface of said tissue. The method includes the step of: tuning said pulsed dye laser to deliver a laser light at a wavelength having a range of from about 570 nanometers to about 650 nanometers, and adjusting said range of pulsed dye laser light generated to a wavelength of about 585 nanometers. The pulsed dye laser has a pulse width in a range of from about 150 microseconds to about 1500 microseconds. Preferably the pulsed dye laser has a pulse width of about 450 microseconds. The method included the pulsed dye laser light being directed at the tissue at a target spot diameter of about 10 mm. The method includes maintaining a fluence of the pulsed dye laser light of less than 5 Joules per square cm.

Brief Description of the Drawings

The objects and advantages of the present invention will become more apparent, when viewed in conjunction with the following drawings, in which:

Figure 1 is a schematic representation of the laser apparatus of the present invention, as it is applied to a layer of skin; and

Figure 2 is a graph showing the absorption characteristics of certain body tissue chromophors versus laser wavelength.

Description of the Preferred Embodiments

Referring now to the drawings in detail, and particularly to figure 1, there is shown the present invention, which comprises a system 10, and methodology for noninvasive wrinkle removal for the modification of collagen beneath the epidermis. The laser system 10 of the present invention, in a preferred embodiment, utilizes a pulsed dye laser 12 having a deep tissue-penetrating wavelength of about 585 nanometers (nm) laser, so as to target hemoglobin "H" of blood in the skin tissue "T". The preferred pulsed dye laser 12 generates a particular laser wavelength energy of 585 nanometers, which is absorbed by the hemoglobin "H". The heat is generated in the skin tissue "T" area up to about 1 mm in depth and typically uses energy of less than 5 Joules per square cm, having a preferred target spot size "S" of about 10 mm diameter circle or larger.

The pulsed dye laser apparatus 12 of the present invention includes a handpiece 14 connected by an optical fiber or wave guide 16, critically, to a pulsed dye laser generator for generating the particular wavelength and fluence of the present invention.

The handpiece 14 focuses, through a plurality of lenses 20 and 22, the pulsed dye laser light "L" from the pulsed dye laser generator 12, onto the spot "S" of about 10 mm in diameter or larger, so as to stimulate new collagen growth beneath the epidermis "E".

In the preferred embodiment of the present invention, the pulse width has a range of 150 microseconds to about 1500 microseconds with a preferred width of about 450 microseconds. The wavelength of the pulsed dye laser apparatus 12 of the present invention lies in a range of about 570 nanometers to about 650 nanometers, with a preferred wavelength of about 585 nanometers. The present invention provides a preferred fluence of less than 5 Joules per square cm., and preferably 3 Joules per square cm at a 10-millimeter diameter skin treatment spot "S".

By treating the skin "T" to this low fluence pulsed dye laser light "L", the collagen beneath the epidermis, that is below about .06 mm. beneath the surface may be stimulated to regenerate and "fill in" valleys of wrinkles for a younger more clearer skin.

Thus what has been shown is a new method of stimulating modification of the collagen layer at a depth of up to about 1 mm to about 1.2 mm beneath the skin surface, utilizing a low energy level of less than 5 Joules per square cm., in a manner not appreciated by the prior art.

We Claim:

1. A method for the treatment of wrinkles on human skin, by stimulating collagen growth beneath the epidermis layer, comprising the steps of:

arranging a pulsed dye laser generator in light communication with a pulsed dye laser delivery device;

applying said pulsed dye laser delivery device against tissue having wrinkles;

generating a pulsed dye laser light by said pulsed dye laser; and

directing said pulsed dye laser light from said pulsed dye laser delivery device onto said tissue, to reach hemoglobin in a collagen layer beneath the surface of said tissue.

2. The method of treatment of wrinkles as recited in claim 1, including the step of:

tuning said pulsed dye laser to deliver a laser light at a wavelength having a range of from about 570 nanometers to about 650 nanometers.

3. The method of treatment of wrinkles as recited in claim 2, including the step of:

adjusting said range of pulsed dye laser light generated to a wavelength of about 585 nanometers.

4. The method of treatment of wrinkles as recited in claim 1, including the step of:

generating said pulsed dye laser at a pulse width in a range of from about 150 microseconds to about 1500 microseconds.

5. The method of treatment of wrinkles as recited in claim 4, including the step of:

generating said pulsed dye laser at a pulse width of about 450 microseconds.

6. The method of treatment of wrinkles as recited in claim 1, including the step of:

directing said pulsed dye laser light at the tissue at a target spot diameter of about 10-mm.

7. The method of treatment of wrinkles as recited in claim 1 including the step of:

maintaining a fluence of said pulsed dye laser light of less than 5 Joules per square cm.

8. A method for the treatment of wrinkles on human skin, by stimulating collagen growth beneath the epidermis layer, comprising the steps of:

arranging a pulsed dye laser generator in light communication with a pulsed dye laser delivery device;

applying said pulsed dye laser delivery device against tissue having wrinkles;

generating a pulsed dye laser light by said pulsed dye laser; and

directing said pulsed dye laser light from said pulsed dye laser delivery device onto said tissue, to reach hemoglobin in a collagen layer beneath the surface of said tissue; and

tuning said pulsed dye laser to deliver a laser light at a wavelength having a range of from about 570 nanometers to about 650 nanometers.

9. The method of treatment of wrinkles as recited in claim 8, including the step of:

adjusting said range of pulsed dye laser light generated to a wavelength of about 585 nanometers.

10. The method of treatment of wrinkles as recited in claim 9, including the step of:

generating said pulsed dye laser at a pulse width in a range of from about 150 microseconds to about 1500 microseconds.

11. The method of treatment of wrinkles as recited in claim 10, including the step of:

generating said pulsed dye laser at a pulse width of about 450 microseconds.

12. The method of treatment of wrinkles as recited in claim 10, including the step of:

energizing said collagen down to a depth of about 1.0-mm to about 1.2mm. below the surface of the skin by said pulsed dye laser.

Abstract of the Disclosure

The present invention includes a system and method for the treatment of wrinkles on human skin, by stimulating collagen growth beneath the epidermis layer, comprising the steps of: arranging a pulsed dye laser generator in light communication with a pulsed dye laser delivery device. The pulsed dye laser delivery device is applied against tissue having wrinkles. The pulsed dye laser generator generates a pulsed dye laser light. A pulsed dye laser light from the pulsed dye laser delivery device is directed onto the tissue, to reach hemoglobin in a collagen layer up to about 1.2mm. beneath the surface of the tissue to effect growth changes therein.

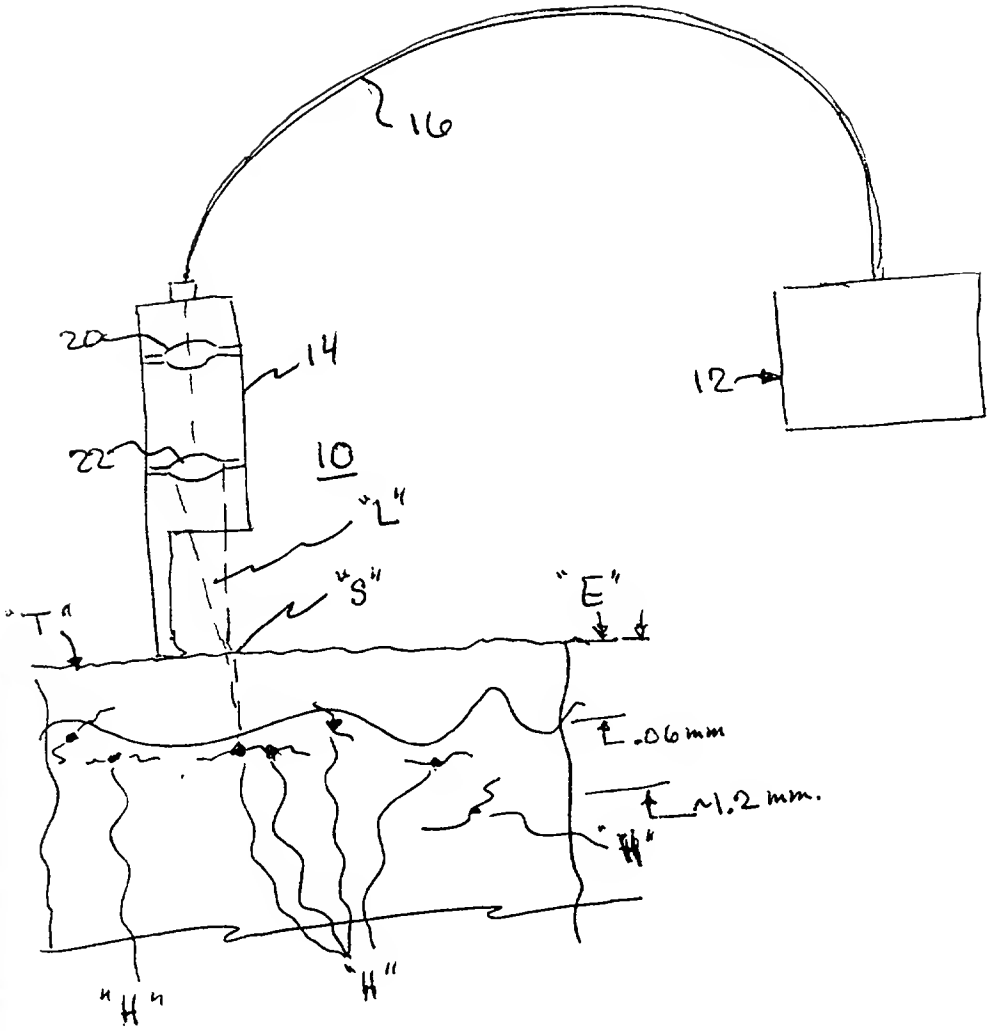

FIG. 1

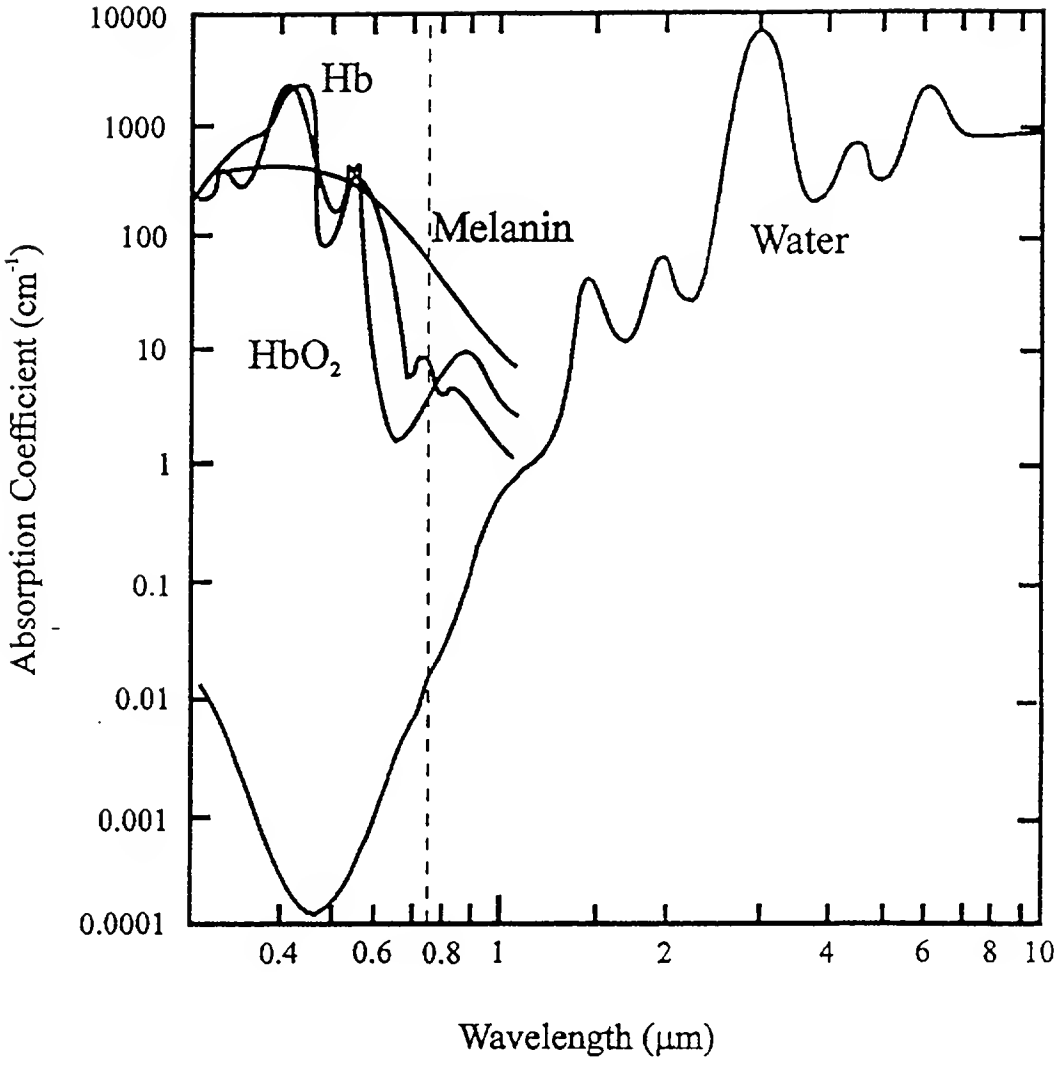
10000
1000
100
10
1
0.1
0.01
0.001
0.0001
Absorption Coefficient (cm^{-1})
Hb
HbO$_2$
Melanin
Water
0.4
0.6
0.8
1
2
4
6
8
10
Wavelength (μm)

Fig 2

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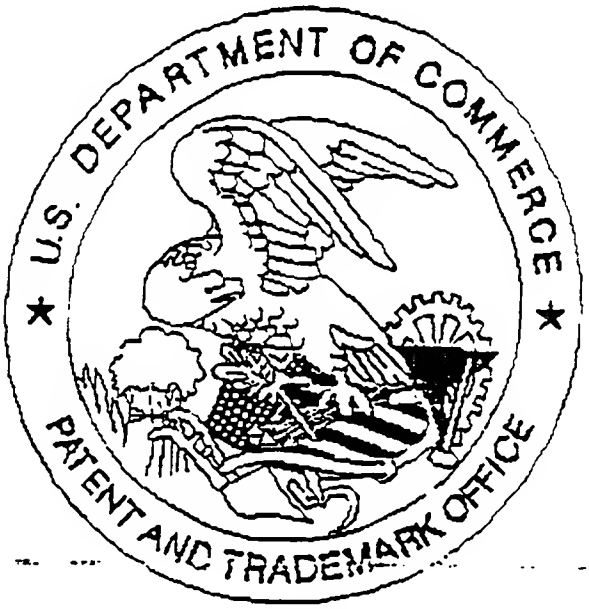

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